



UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)
(Baba Sahib Ambedkar Road, Jammu-180006 (J&K))

Academic Section

Email: academicsectionju14@gmail.com

NOTIFICATION (24/February/Adp./108)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Courses of Studies in the subject of **Industrial Fish and Fisheries** of Semester Vth, VIth, VIIth and VIIIth for Four Year Under Graduate Programme (FYUGP) under the **Choice Based Credit System** as per NEP-2020 (as given in the annexure) for the examinations to be held in the years as per the details given below:

Subject	Semester	For the examinations to be held in the year
Industrial Fish and fisheries	Semester-V	December 2024, 2025 and 2026
	Semester-VI	May 2025, 2026 and 2027
	Semester-VII	December 2025, 2026 and 2027
	Semester-VIII	May 2026, 2027 and 2028

The Syllabi of the courses are also available on the University website: www.jammuuniversity.ac.

Sd/-

DEAN ACADEMIC AFFAIRS

No. F. Acd/II/24/14504-14513

Dated: 01/03/2024

Copy for information and necessary action to:

1. Dean Faculty of Life-Science
2. HOD/Convener, Board of Studies **Industrial Fish and Fisheries**
3. Sr. P.A. to the Controller of Examinations
4. All members of the Board of Studies
5. Confidential Assistant to the Controller of Examinations
6. Director, Computer Centre, University of Jammu
7. Deputy Registrar/Asstt. Registrar (Conf. /Exams. UG)
8. Incharge University Website for necessary action please

Sunilshamo
29/2/24
Deputy Registrar (Academic)
AS 28/2/24
AS 29/2/24
AS 28/2/24

COURSE FRAMEWORK OF THE FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP)**UNDER NATIONAL EDUCATION POLICY (NEP-2020)****UNDERGRADUATE COURSE (INDUSTRIAL FISH AND FISHERIES)****PROPOSED COURSE SCHEME FOR SEMESTER-V****EXAMINATION TO BE HELD IN DEC 2024, DEC 2025, DEC 2026**

S.No.	COURSE TYPE	COURSE CODE	COURSE TITLE	CREDITS	MAXIMUM MARKS		
					THEORY	PRACTICAL	TOTAL
1.	Major	UMJIFT501	FISH BREEDING TECHNOLOGY	4	75	25	100
2.	Major	UMJIFT502	FISH GENETICS AND BIOTECHNOLOGY	4	75	25	100
3.	Major	UMJIFT503	FISH DISEASE MANAGEMENT	4	75	25	100
4.	Major	UMJIFT504	FISHERIES CONSERVATION	2	50	-	50
5.	Minor	UMIIFT505	FISH BREEDING	4	75	25	100
6.	Summer Internship	USEIFI506	SUMMER INTERNSHIP	2	-	50	50

PROPOSED COURSE SCHEME FOR SEMESTER-VI**EXAMINATION TO BE HELD IN MAY 2025, MAY 2026, MAY 2027**

S.No.	COURSE TYPE	COURSE CODE	COURSE TITLE	CREDITS	MAXIMUM MARKS		
					THEORY	PRACTICAL	TOTAL
1.	Major	UMJIFT601	FISHING GEAR AND CRAFT TECHNOLOGY	4	75	25	100
2.	Major	UMJIFT602	FISH FINDING AND NAVIGATION TECHNOLOGY	4	75	25	100
3.	Major	UMJIFT603	FISH POST HARVESTING TECHNOLOGY	4	75	25	100
4.	Major	UMJIFT604	BIOINSTRUMENTATION AND STATISTICS IN FISHERIES	4	75	25	100
5.	Minor	UMIIFT605	FISH PROCESSING TECHNOLOGY	4	75	25	100

**COURSE FRAMEWORK OF THE FOUR YEAR UNDERGRADUATE PROGRAMME (FYUGP)
UNDER NATIONAL EDUCATION POLICY (NEP-2020)
UNDERGRADUATE COURSE (INDUSTRIAL FISH AND FISHERIES)**

**PROPOSED COURSE SCHEME FOR SEMESTER-VII
EXAMINATION TO BE HELD IN DEC 2025, DEC 2026, DEC 2027**

S.No.	COURSE TYPE	COURSE CODE	COURSE TITLE	CREDITS	MAXIMUM MARKS		
					THEORY	PRACTICAL	TOTAL
1.	Major	UMJIFT701	FINFISH AND SHELLFISH TAXONOMY	4	75	25	100
2.	Major	UMJIFT702	FINFISH AND SHELLFISH BIOLOGY	4	75	25	100
3.	Major	UMJIFT703	CAPTURE FISHERIES	4	75	25	100
4.	Major	UMJIFT704	RESEARCH METHODOLOGY AND ETHICS	4	75	25	100
5.	Minor	UMIIFT705	BIOLOGY OF FINFISHES AND SHELLFISHES	4	75	25	100

**PROPOSED COURSE SCHEME FOR SEMESTER-VIII (HONOURS)
EXAMINATION TO BE HELD IN MAY 2026, MAY 2027, MAY 2028**

S.No.	COURSE TYPE	COURSE CODE	COURSE TITLE	CREDITS	MAXIMUM MARKS		
					THEORY	PRACTICAL	TOTAL
1.	Major	UMJIFT801	FINFISH AND SHELLFISH ANATOMY	4	75	25	100
2.	Major	UMJIFT802	FINFISH AND SHELLFISH PHYSIOLOGY	4	75	25	100
3.	Major	UMJIFT803	AQUATIC ECOLOGY	4	75	25	100
4.	Major	UMJIFT804	FISHERIES ECONOMICS	4	75	25	100
5.	Minor	UMIIFT805	AQUATIC BIODIVERSITY	4	75	25	100

**PROPOSED COURSE SCHEME FOR SEMESTER-VIII (HONOURS WITH RESEARCH)
EXAMINATION TO BE HELD IN MAY 2026, MAY 2027, MAY 2028**

S.No.	COURSE TYPE	COURSE CODE	COURSE TITLE	CREDITS	MAXIMUM MARKS		
					THEORY	PRACTICAL	TOTAL
1.	Major	UMJIFT806	FISHERIES EXTENSION AND LEGISLATION	4	75	25	100
2.	Minor	UMIIFT807	FISH LAWS AND EXTENSION EDUCATION	4	75	25	100
3.	SEC	USEIFT808	DISSERTATION	12	-	-	300

University of Jammu
Syllabi of Industrial Fish and Fisheries for FYUGP under CBCS as per NEP-2020
SEMESTER-V
(Examination to be held in 2024, 2025, 2026)

Major Course

Course Code: **UMJIFT-501**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISH BREEDING TECHNOLOGY**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT-502**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISH GENETICS AND BIOTECHNOLOGY**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT-503**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISH DISEASE MANAGEMENT**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT-504**
Credits: 02(Theory)
Maximum Marks: 50
Theory : 50

Course Title: **FISHERIES CONSERVATION**
Total no. of lectures: Theory: 45 hours

Minor Course

Course Code: **UMIIFT-505**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISH BREEDING**
Total no. of lectures: Theory: 45 hours

Summer Internship Course

Course Code: **USEIFI-506**
Credits: 02

Course Title: **SUMMER INTERNSHIP**
Maximum Marks: 50



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2024, 2025 & 2026
(MAJOR COURSE)
UG SEMESTER-V
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJIFT-501
MAJOR CORE COURSE TITLE	:	FISH BREEDING TECHNOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course intends to impart knowledge of the basic principles of breeding techniques and their application to fisheries management and aquaculture

UNIT I: REPRODUCTION IN TELEOST FISHES (13 Hrs.)

- 1.1 Gonad anatomy and reproductive mechanisms
- 1.2 Reproductive cycle and maturity stages
- 1.3 Spawning and Fecundity
- 1.4 Embryonic and larval development

UNIT 2: INDUCED BREEDING (13 Hrs.)

- 2.1 Broodstock development, quality and its health management
- 2.2 History of Induced breeding
- 2.3 Induced breeding by hypophysation
- 2.4 Use of different natural, synthetic hormones and analogues and their application

UNIT 3: BUNDH BREEDING AND HATCHERY MANAGEMENT (10 Hrs.)

- 3.1 Bundh breeding and types
 - 3.1.1 Dry bundh and Wet bundh
 - 3.1.2 Modern bundh
- 3.2 Traditional hatcheries-Hatching pits and Hatching happa
- 3.3 Chinese hatchery-Construction and working
- 3.4 Hatchery protocols and water quality management



UNIT 4: BREEDING OF COMMERCIALY IMPORTANT FISHES AND SHELLFISHES

(10 Hrs.)

- 4.1 Trout breeding and hatchery techniques
- 4.2 Ornamental fish breeding- Live bearers and egg layers
- 4.3 Fresh water prawn breeding (*Macrobrachium rosenbergii*)
- 4.4 Breeding techniques and culture of catfish- *Pangasius*

Practicum

(30 Hrs.)

- 1. Museum survey of commercially important finfishes
- 2. Design and working of Chinese Hatcheries
- 3. Design and working of Traditional bundh
- 4. Design and working of Modern bundh
- 5. Identification of fish seed
- 6. Packing of fish seed for stocking
- 7. Study of Trout farm throughcharts/models
- 8. Study of Freshwater prawn hatcherythrough charts/models
- 9. Physico-chemical analysis of water- D.O. and pH.
- 10. Visit to different hatcheries

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous Assessment	-	-	10 (Based on Daily Performance only)
Final Practical Examination	-	-	15

External End Semester Theory Examination will have two sections(A &B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e.,one question from each unit. Each question shall be of 3marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (TotalMarks15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

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RECOMMENDED READINGS

1. Ayyappan, S (2010) Handbook of Fisheries and Aquaculture
2. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
3. Mahapatra, B.K., Dutta S., Pailan, G.H.(2015) Ornamental Fish Breeding, Culture and Trade
4. Zaidi, S.G.S (2002) Ornamental fish culture
5. Axelrod HR & Sweenen ME. 1992. *The Fascination of Breeding Aquarium Fishes*. TFH Publ.
6. ICAR. 2006. *Handbook of Fisheries and Aquaculture*. ICAR.23
7. Spotte S. 1979. *Fish and Invertebrate Culture*. John Wiley & Sons.



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(MAJOR COURSE)
UG SEMESTER-V
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJIFT-502
MAJOR CORE COURSE TITLE	:	FISH GENETICS AND BIOTECHNOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To provide an overview of the application of biotechnological and genetically modified tools in fish breeding, feed, health, processing and other facets in fisheries.

UNIT I: FISH CYTOGENETICS

(12 Hrs.)

- 1.1 Principles of genetics - Mendelism and gene interactions.
- 1.2 Structure and evolution of fish chromosomes and karyotypes.
- 1.3 Different techniques used in cytogenetics.
- 1.4 Sex linked genes and genetic markers.

UNIT 2: GENETIC IMPROVEMENT IN FISHES

(12 Hrs.)

- 2.1 Inbreeding and cross breeding.
- 2.2 Hybridization in fishes.
- 2.3 Sex control, sex reversal and role of steroids in sex reversal.
- 2.4 Chromosomal manipulation - polyploidy, androgenesis and gynogenesis.

UNIT 3: GENETIC ENGINEERING AND BIOTECHNOLOGY

(12 Hrs.)

- 3.1 Construction of recombinant DNA.
- 3.2 Gene cloning methods, cloning vectors (plasmids, bacteriophage and cosmids).
- 3.3 Sequencing of nucleic acid by Maxam Gilbert and Sangar's methods.
- 3.4 Southern, Northern, Southern - Western blotting methods.



UNIT 4: GENE TRANSFER TECHNOLOGY

(10 Hrs.)

4.1 Transgenic fish and shellfish - basic principles and their applications in aquaculture.

4.2 Primary cell culture, sub-culture and fish cell lines - advantages, disadvantages.

4.3 Fish Breeding: Synthetic hormones for induced breeding- GnRH analogue

4.4 Gene Bank and conservation: Cryopreservation of gametes and embryos.

Practicum

(30 Hrs.)

1. Induced breeding of carps
2. Principles of sterile techniques and cell propagation
3. Hybridoma technology: strategy and techniques
4. Fish vaccination techniques
5. Production of monoclonal antibodies.
6. DNA sequencing and analysis
7. Southern blotting.
8. Study of Fish karyotypes.
9. Study of Transgenic fishes through charts and models.
10. Study of Transgenic shellfishes through charts and models.

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections(A &B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e.,one question from each unit. Each question shall be of 3marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (TotalMarks15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

RECOMMENDED READINGS

1. Campbell MA & Heyer LJ. 2003. *Discovering Genomics, Proteomics, and Bioinformatics*. Benjamin Cummings.
2. Clynes M. 1998. *Animal Cell Culture Techniques*. Springer.
3. Freshney I. 1994. *Culture of Animal Cells: A Manual of Basic Techniques*. 4th Ed. Wiley-Liss.
4. Harrison AM, Rae FI & Harris A. 1997. *General Techniques of Cell Culture*. Cambridge University Press.
5. Lan FR. 1994. *Culture of Animal Cells*. 3rd Ed. Wiley-Liss.
6. Masters RW. 2000. *Animal Cell Culture-Practical Approach*. Oxford University Press.
7. Caetano-Anolles G & Gresshoff PM. 1998. *DNA Markers: Protocols, Applications and Overviews*. Wiley-VCH.



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(MAJOR COURSE)
UG SEMESTER-V
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJIFT-503
MAJOR CORE COURSE TITLE	:	FISH DISEASE MANAGEMENT
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To acquaint students with different aspects of fish and shellfish immunology and to make them perform disease diagnostic techniques, helping them to characterize the pathogens along with their prophylactic and therapeutic measures.

UNIT I: FISH IMMUNOLOGY

(13 Hrs.)

- 1.1 Introduction to Fish immunology
- 1.2 Types of immunity- Innate and Adaptive
- 1.3 Structure and functions of Antigens and Antibodies
- 1.4 Specific and Non specific defense system

UNIT 2: DISEASE DIAGNOSTIC TECHNIQUES

(12 Hrs.)

- 2.1 Disease diagnostic techniques
- 2.2 Microbiological techniques.
- 2.3 Histopathological, immuno - histopathological and haematological methods of fish disease diagnosis.
- 2.4 ELISA and PCR.

UNIT 3: DISEASES OF FINFISHES

(12 Hrs.)

- 3.1 Major bacterial diseases of fishes, their characteristics, symptoms, prophylactic and therapeutic measures.
- 3.2 Major fungal diseases of fishes, their characteristics, symptoms, prophylactic and therapeutic measures.
- 3.3 Major viral diseases of fishes, their characteristics, symptoms, prophylactic and therapeutic measures.
- 3.4 Major parasitic diseases of fishes, their characteristics, symptoms, prophylactic and therapeutic measures.



UNIT 4: DISEASES OF SHELLFISHES

(12 Hrs.)

4.1 Major bacterial diseases of shellfishes, their characteristics, symptoms, prophylactic and therapeutic measures.

4.2 Major fungal diseases of shellfishes, their characteristics, symptoms, prophylactic and therapeutic measures.

4.3 Major viral diseases of shellfishes, their characteristics, symptoms, prophylactic and therapeutic measures.

4.4 Major parasitic diseases of shellfishes, their characteristics, symptoms, prophylactic and therapeutic measures.

Practicum

(30 Hrs.)

1. Diagnosis of diseased fish.
2. Preparation of permanent mounts of fish pathogens.
3. Collection of diseased fishes from local water-bodies.
4. Sampling and culture techniques of various microbes.
5. To study ELISA technique.
6. Isolation and identification of bacterial pathogens.
7. Isolation and identification of viral pathogens.
8. Isolation and identification of fungal pathogens.
9. Isolation and identification of parasitic pathogens.
10. Structure and functions of Antigens and Antibodies.

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous Assessment	-	-	10 (Based on Daily Performance only)
Final Practical Examination	-	-	15

External End Semester Theory Examination will have two sections(A &B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e.,one question from each unit. Each question shall be of 3marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.




Internal Assessment (Total Marks 15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

RECOMMENDED READINGS

1. ADCP (Aquaculture Development and Co-ordination Programme). 1980.
2. Aline W. 1980. *Fish Diseases*. Springer Verlag.
3. Andrews C, Excell A & Carrington N. 1988. *The Manual of Fish Health*. Salamander Books.
4. Austin B & Austin DA. 1987. *Bacterial Fish Pathogens (Diseases in Farmand Wild)*. Ellis Harward.
5. Felix S, Riji John K, Prince Jeyaseelan MJ & Sundararaj V. 2001. *Fish Disease Diagnosis and Health Management*. Fisheries College and Research Institute, T.N. Veterinary and Animal Sciences University.
6. Inglis V, Roberts RJ & Bromage NR. 1993. *Bacterial Diseases of Fish*. Blackwell.
7. Iwama G & Nakanishi T. (Eds.). 1996. *The Fish Immune System - Organism, Pathogen and Environment*. Academic Press.
8. Roberts RJ. 2001. *Fish Pathology*. 3rd Ed. WB Saunders.
9. Schaperclaus W. 1986. *Fish Diseases*. Vols. I, II. Oxonian Press.
10. Shankar KM & Mohan CV. 2002. *Fish and Shellfish Health Management*. UNESCO Publ.
11. Sindermann CJ. 1990. *Principal Diseases of Marine Fish and Shellfish*. Vols. I, II. 2nd Ed. Academic Press.
12. Walker P & Subasinghe RP. (Eds.). 2005. *DNA Based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animal Pathogens and Diseases*. FAO Publ.
13. Wedmeyer G, Meyer FP & Smith L. 1999. *Environmental Stress and Fish Diseases*. Narendra Publ. House.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2024, 2025 & 2026
(MAJOR COURSE)
UG SEMESTER-V
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJIFT-504
MAJOR CORE COURSE TITLE	:	FISHERIES CONSERVATION
CREDITS	:	02
MAXIMUM MARKS	:	50
I) External (University Exam)	:	40
II) Internal Assessment	:	10
DURATION OF UNIVERSITY EXAM	:	02 Hrs 30 minutes

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course helps to gain students in-depth knowledge on the categorization, utilization, conservation and management of fisheries resources.

UNIT I: FISHERIES RESOURCES AND THEIR CONSERVATION (15 Hrs.)

- 1.1 Marine biodiversity: threats, planning and management, tools for conservation.
- 1.2 Freshwater biodiversity: threats, planning and management, tools for conservation.
- 1.3 Wetlands – Destruction, causes, consequences and conservation.
- 1.4 Problems and conservation of brackish water fisheries.

UNIT 2: METHODS OF CONSERVATION OF FISH BIODIVERSITY (15 Hrs.)

- 2.1 Current levels of biodiversity, alpha and beta biodiversity
- 2.2 In situ and exsitu conservation-gene banks, species conservation.
- 2.3 Intellectual Property Rights (IPR) and protection (IPP)
- 2.4 Concept of MSY (Maximum Sustainable Yield), MEY (Maximum Economic Yield)

UNIT 3: FISH POPULATION DYNAMICS AND CONSERVATION (15 Hrs.)

- 3.1 Fish population: Structure, estimation and factors affecting fish population
- 3.2 Problems of overfishing
- 3.3 Concept of MSY (Maximum Sustainable Yield) and MEY (Maximum Economic Yield)
- 3.4 Fisheries and fishing methods in open waters:
 - 3.4.1 Inshore fisheries (up to 50 m depth)
 - 3.4.2 Offshore fisheries (50-200 m depth)
 - 3.4.3 High sea fisheries (beyond 200m) up to outer limit of EEZ and in International waters.



NOTE FOR PAPER SETTING

Examination Theory	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	10
External Theory End Semester	100%	3 Hours	40

RECOMMENDED READINGS

1. Chandra P. 2007. *Fishery Conservation, Management and Development*. SBS Publ.
2. Jhingran, V.G. (1985) *Fish and Fisheries of India*
3. Gupta, S.K and Gupta, P.C (2008) *General and applied ichthyology (Fish and Fisheries)*
4. Ayyappan, S (2010) *Handbook of Fisheries and Aquaculture*
5. Talwar, P.K. *Inland Fisheries of India*
6. Dholakia AD. 2004. *Fisheries and Aquatic Resources of India*. Daya Publ.House.
7. Kurian-CV & Sebastian VO. 1986. *Prawns and Prawn Fisheries of India*: Hindustan Publ. Corp.
8. Peter BM & Joseph JC. Jr. 2000. *Fishes- An Introduction to Ichthyology*. 4th Ed. Prentice Hall.
9. Samuel CT. 1968. *Marine Fisheries in India*. Narendra Publ. House.
10. Shanbhogue SL. 2000. *Marine Fisheries of India*. ICAR.
11. Yadav BN. 1997. *Fish and Fisheries*. 2nd Ed. Daya Publ. House.
12. Srivastava, C.B.L. 2001. *A Text Book of Fishery Science and Indian Fisheries*. KitabMahal, Delhi.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2024, 2025 & 2026
(MINOR COURSE)
UG SEMESTER-V
UNDER NEP-2020

MINOR CORE COURSE NO.	:	UMIIFT-505
MINOR CORE COURSE TITLE	:	FISH BREEDING
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course intends to impart knowledge of the basic principles of breeding techniques and their application to fisheries management and aquaculture

UNIT 1: REPRODUCTION IN TELEOST FISHES (13 Hrs.)

- 1.1 Gonad anatomy and reproductive mechanisms
- 1.2 Reproductive cycle and maturity stages
- 1.3 Spawning and Fecundity
- 1.4 Embryonic and larval development

UNIT 2: INDUCED BREEDING (13 Hrs.)

- 2.1 Broodstock development, quality and its health management
- 2.2 History of Induced breeding
- 2.3 Induced breeding by hypophysation
- 2.4 Use of different natural, synthetic hormones and analogues and their application

UNIT 3: BUNDH BREEDING AND HATCHERY MANAGEMENT (10 Hrs.)

- 3.1 Bundh breeding and types
 - 3.1.1 Dry bundh and Wet bundh
 - 3.1.2 Modern bundh
- 3.2 Traditional hatcheries-Hatching pits and Hatching happa
- 3.3 Chinese hatchery-Construction and working
- 3.4 Hatchery protocols and water quality management



UNIT 4: BREEDING OF COMMERCIALY IMPORTANT FINFISHES AND SHELLFISHES

(10 Hrs.)

- 4.1 Trout breeding and hatchery techniques
- 4.2 Ornamental fish breeding- Live bearers and egg layers
- 4.3 Fresh water prawn breeding (*Macrobrachium rosenbergii*)
- 4.4 Breeding techniques and culture of catfish- *Pangasius*

Practicum

(30 Hrs.)

1. Museum survey of commercially important finfishes
2. Design and working of Chinese Hatcheries
3. Design and working of Traditional bundh
4. Design and working of Modern bundh
5. Identification of fish seed
6. Packing of fish seed for stocking
7. Study of Trout farm through charts/models
8. Study of Freshwater prawn hatchery through charts/models
9. Physico-chemical analysis of water- D.O. and pH.
10. Visit to different hatcheries

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External EndSemesterTheoryExamination will have two sections(A &B)(TotalMarks 60)

SectionA:Four short answer questions representing all units/syllabi.e.,one question from each unit.Each question shall be of 3marks.

SectionB:Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.

15

Internal Assessment(TotalMarks15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

RECOMMENDED READINGS

1. Ayyappan, S (2010) Handbook of Fisheries and Aquaculture
2. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
3. Mahapatra, B.K., Dutta S., Pailan, G.H.(2015) Ornamental Fish Breeding, Culture and Trade
4. Zaidi, S.G.S (2002) Ornamental fish culture
5. Axelrod HR & Sweenen ME. 1992. *The Fascination of Breeding Aquarium Fishes*. TFH Publ.
6. ICAR. 2006. *Handbook of Fisheries and Aquaculture*. ICAR.23
7. Spotte S. 1979. *Fish and Invertebrate Culture*. John Wiley & Sons.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2024, 2025 & 2026
(SUMMER INTERNSHIP COURSE)
UG SEMESTER-V
UNDER NEP-2020

COURSE NO.	:	USEIFI-506
COURSE TITLE	:	SUMMER INTERNSHIP COURSE
CREDITS	:	02
MAXIMUM MARKS	:	50

It shall be a short-term internship of 15 days duration in 5th semester for job/professional training in a suitable organization or hands on training or activity-based course at college level in order to gain work experience.

All students will undergo internships / Apprenticeships in a firm, industry, or organization or Training in labs with faculty and researchers in their own or other HEIs/research institutions during the summer term. Students will be provided with opportunities for internships with local industry, business organizations, health and allied areas, local governments (such as panchayats, municipalities), Parliament or elected representatives, media organizations, artists, crafts persons, and a wide variety of organizations so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.

Community engagement and service: The curricular component of 'community engagement and service' seeks to expose students to the socio-economic issues in society so that the theoretical learning can be supplemented by actual life experiences to generate solutions to real-life problems. This can be part of summer term activity.

Field-based learning/minor project: The field-based learning/minor project will attempt to provide opportunities for students to understand the different socio-economic contexts. It will aim at giving students exposure to development-related issues in rural and urban settings. It will provide opportunities for students to observe situations in rural and urban contexts, and to observe and study actual field situations regarding issues related to socioeconomic development. Students will be given opportunities to gain a first-hand understanding of the policies, regulations, organizational structures, processes, and programmes that guide the development process. They would have the opportunity to gain an understanding of the complex socio-economic problems in the community, and innovative practices required to generate solutions to the identified problems. This may be a summer term project.

SCHEME OF EXAMINATION

The internship shall be under a college teacher who will be designated as Internship Supervisor. After completion of summer internship students will have to produce a report related to the work carried out signed by internship supervisor and college principal. The internship will be evaluated internally by a Board of Examiners set up by the principal of the college.

Note: The minimum passing criteria for the summer internship is 40%.



Scheme of Internship

It shall be a short-term internship of duration 15 days for a job/professional training in a suitable organization or hands on training or activity-based course at college level in order to gain work experience. The internship shall be under a college teacher who will be designated as Internship Supervisor. After completion of summer internship students will have to produce a report related to the work carried out.

Report Guidelines: The interns will write their report as per the format given below:

1. Introduction
2. Materials and Methods
3. Results
4. Discussion
5. Conclusion
6. References

This structure allows participants to gain hands-on experience in various laboratory techniques and apply their knowledge through a project. The project report serves as a valuable component to assess their understanding and application of the learned skills.

Monitoring and Evaluation:

The designated Internship Supervisor will monitor the progress and evaluate student's internship course at the end of semester on the basis of Internship Report/Seminar presentation/Viva-voce.



University of Jammu
Syllabi of Industrial Fish and Fisheries for FYUGP under CBCS as per NEP-2020
SEMESTER-VI
(Examination to be held in 2025, 2026, 2027)

Major Course

Course Code: **UMJIFT-601**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISHING GEAR AND CRAFT TECHNOLOGY**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT-602**
Credits: 04 {03(Theory) + 01(Practical)}
Practical : 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISH FINDING AND NAVIGATION TECHNOLOGY**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT-603**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISHPOST HARVESTING TECHNOLOGY**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT-604**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **BIOINSTRUMENTATION AND STATISTICS IN FISHERIES**
Total no. of lectures: Theory: 45 hours

Minor Course

Course Code: **UMIIFT-605**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FISH PROCESSING TECHNOLOGY**
Total no. of lectures: Theory: 45 hours



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2025, 2026 & 2027
(MAJOR COURSE)
UG SEMESTER-VI
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJIFT-601
MAJOR CORE COURSE TITLE	:	FISHING GEAR AND CRAFT TECHNOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To learn advanced fishing gear designing and crafts, to study the construction of various fishing gears and crafts, To learn fishing gear survey techniques.

UNIT - I FISHING GEAR TECHNOLOGY

(13 Hrs.)

- 1.1 Classification of fishing gear (FAO and A. Von Brandt)
- 1.2 Fishing gear materials- natural, synthetic materials, properties and preservation
- 1.3 Fishing gear accessories- floats, sinkers, otter board, hook and ropes.
- 1.4 Traditional fishing gears –Design and Working
 - 1.4.1 Gill net
 - 1.4.2 Cast net
 - 1.4.3 Drag net

UNIT 2: MODERN FISHING TECHNOLOGY

(13 Hrs.)

- 2.1 Design and working of Trawlers.
- 2.2 Design and working of Purse seines.
- 2.3 Design and working of Long lines.
- 2.4 Design and working of Squid jigging.

UNIT 3: FISHING CRAFT TECHNOLOGY

(10 Hrs.)

- 3.1 Fishing craft materials.
 - 3.1.1 Wood.
 - 3.1.2 Fiberglass Reinforced Plastic.
 - 3.1.3 Ferro cement.
- 3.2 Boat designing and construction.
- 3.3 Care and maintenance of fishing craft.
- 3.4 Classification and description of different type of fishing crafts in India (inland and marine).



UNIT 4: RESPONSIBLE FISHERIES

(10 Hrs.)

- 4.1 Exclusive Economic Zone (EEZ) and Coastal Regulation Zone (CRZ).
- 4.2 Turtle Exclusion Devices (TED) and By-catch Reduction Devices (BRD).
- 4.3 Marine corrosion: Types, Causes and effects on fishing crafts.
- 4.4 Monsoon trawl ban, closed season, mesh size regulations, overfishing.

Practicum

(30 Hrs.)

- 1. Design and working of Trawlers
- 2. Design and working of Purse seiners
- 3. Design and working of Long Liners
- 4. Design and working of Squid jigging
- 5. Design and working of Gill net
- 6. Design and working of Cast net
- 7. Design and labeling of a boat and its parts
- 8. Design and working of Raft
- 9. Design and working of Catamaran
- 10. Identification of biofoulers

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3marks.

SectionB: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.



Internal Assessment(TotalMarks15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

RECOMMENDED READINGS.

1. Baranov FI. 1977. Selected Works on Fishing Gear. KeterpressEnterprises.Israel.
2. Ben-Yami M. 1994. Purse Seining Manual. FAO Fishing Manual.
3. Biswas KP. 1996. Harvesting Aquatic Resources. Daya Publ. House.
4. FAO. 1987. Small Scale Fishing Gear.
5. Fridman AL. 1986. Calculations for Fishing Gear Designs. FAO.Fishing Manual. Fishing News Books.
6. Garner J. 1988. Modern Deep Sea Trawling Gear. Fishing News Books.
7. Hameed SM &Boopendranath MR. 2000. Modern Fishing Gear Technology. Daya Publ. House.
8. Kristionsson H. 1975. Modern Fishing Gear of the World. The White Friars Press.
9. Sreekrishna Y &Shenoy L. 2001. Fishing Gear and Craft Technology. ICAR.
10. Fyson JF. (Ed). 1985. Design of Small Fishing Vessels. Fishing News Books.
11. Sanisbury JC. 1996. Commercial Fishing Methods-An Introduction to Vessels and Gear. Fishing News Books.
12. Shenoy L. 1988. Course Manual in Fishing Technology. CIFE, Mumbai.
13. Sreekrishna Y &Shenoy L. 2001. Fishing Gear and Craft Technology. ICAR.
14. Meenakumari, Boopendranath, Pravin ,Saly Thomas and Leela Edwin 2009. Hand book of fishing Technology. CIFT (ICAR) Niseem Printers and Publishers, Cochin.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2025, 2026 & 2027
(MAJOR COURSE)
UG SEMESTER-VI
UNDER NEP-2020

MAJOR CORE COURSE NO.	: UMJIFT-602
MAJOR CORE COURSE TITLE	: FISH FINDING AND NAVIGATION TECHNOLOGY
CREDITS	: 04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	: 75
I) External (University Exam)	: 60
II) Internal Assessment	: 15
DURATION OF UNIVERSITY EXAM	: 03 Hours
MAXIMUM MARKS PRACTICALS	: 25
i) Continuous assessment	: 10
ii) Final examination	: 15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To learn engineering aspects of fish finding equipments and navigation techniques along with seamanship for handling of fishing vessels under all conditions at sea.

UNIT I: FISH AGGREGATION

(12 Hrs.)

- 1.1 Fish aggregation, sites and causes.
- 1.2 Fish shoaling behavior.
- 1.3 Fish Aggregating Devices: objectives and construction.
- 1.4 Deployment and Maintenance of Fish Aggregating Devices.

UNIT 2: ACOUSTIC FISH FINDING EQUIPMENTS:

(12 Hrs.)

- 2.1 Acoustic surveys in fish population studies.
- 2.2 Water-ultra sonic sound and its characteristics.
- 2.3 Advanced models of Echo sounder – components, specifications and uses.
- 2.4 Sonar – components, specifications and uses.

UNIT 3: NAVIGATIONAL EQUIPMENTS

(12 Hrs.)

- 3.1 Navigation – types, navigational equipments, RADAR and Compass.
- 3.2 Satellite navigation system: GPS – Components, working and applications.
- 3.3 Vessel monitoring systems (VMS); communication systems.
- 3.4 Safety devices –SART, EPIRB, GMDSS.

UNIT 4: SEAMANSHIP AND NAVIGATION

(10 Hrs.)

- 4.1 Seamanship: Handling of fishing vessels under all conditions at sea
- 4.2 Accidents at marine environment- causes, preventive measures and preparedness for Fishing vessels

- 4.3 Code of Conduct for Responsible Fishing (CCRF)
4.4 Article 8: Fishing Operations

Practicum

(30 Hrs.)

1. Chart work of navigational equipment
2. Operation of echo sounder
3. Operation of GPS
4. Operation of Radar
5. Operation of Compass
6. Operation of Sonar
7. Types of shoals and structures of shoals
8. Seaman duties protocol

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) (Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

RECOMMENDED READINGS

1. CIFNET. 2004. *Fishery Engineering*: 212-238pp.
2. FAO. 1998. *Fishing Operations. – Vessel Monitoring Systems*, FAO Technical Guidelines for Responsible Fisheries No. 1, Suppl. 1, FAO Rome.



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3. Joshy CD and Devadhason M. 2001. *Basic Electronics and Fish Finding Equipments*. CIFNET. Cochin: 31-42pp.
4. Larkin FJ. 1998. *Basic Coastal Navigation*, 2nd edn, Sheridan House Inc., New York: 273
5. MacLennan DN and Simmonds EJ. 1992. *Fisheries Acoustics, Fish and Fisheries Series 5*,
6. Chapman and Hall, London, 323 p.
7. Mitson RB. Fisheries SONAR. *Fishing News Books Ltd. England: 274p.*
8. Sreekrishnan Y and ShenoyLatha. 2001. *Fishing Gear and Craft Technology*. Indian Council of Agricultural Research, New Delhi, 342 p.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2025, 2026 & 2027
(MAJOR COURSE)
UG SEMESTER-VI
UNDER NEP-2020

MAJOR CORE COURSE No.	:	UMJIFT-603
MAJOR CORE COURSE TITLE	:	FISH POST HARVESTING TECHNOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To provide information on various fish preservation techniques and by-products; utilization of fishery wastes and their nutritional value. To understand various aspects of quality assurance system, quality management and national / international certification system to learn factory sanitation and hygiene, water quality and standard

UNIT I: BIOCHEMICAL COMPOSITION AND FISH SPOILAGE (13 Hrs.)

- 1.1 Chemical composition of fish- moisture, ash, carbohydrates, proteins and lipids.
- 1.2 Rigor mortis - freshness test and biochemical spoilage.
- 1.3 Role of microbes in fish spoilage.
- 1.4 Microbial analysis of fish and fish products (*Vibrio*, *Salmonella*, *Shigella*, *Staphylococcus* etc.).

UNIT 2: FISH PRESERVATION TECHNOLOGY (12 Hrs.)

- 2.1 Principles and importance of fish preservation.
- 2.2 Traditional methods of fish preservation - Sundrying, smoking, chilling and salting.
- 2.3 Canning.
- 2.4 Freezing.

UNIT 3: FISH PRODUCTS AND BYPRODUCTS (12 Hrs.)

- 3.1 Fish protein concentrate.
- 3.2 Fish body and liver oils: Extraction, purification, preservation and storage .
- 3.3 Value added products - fish fingers, fish flakes, breaded battered minced products, etc.
- 3.4 Fish byproducts: Fish silage, Fish meal, Fish manure, isinglass and Surimi.

UNIT 4: QUALITY ASSURANCE (12 Hrs.)

- 4.1 Quality assessment of fish products.
- 4.2 Fish inspection in Indian fisheries industries.



4.3 Hazard Analysis and Critical Control Point (HACCP) principles, practical aspects of planning and implementation

4.4 Quality control system, various national and international standards on fishery products (BS-5750 and ISO 9000).

Practicum

(30 Hrs.)

1. Andrew CC. 1990. *Food Refrigeration Processes*. Elsevier.
2. Balachandran KK. 2001. *Post-harvest Technology of Fish and Fish Products*. Daya Publ. House.
3. Clucas IJ. 1981. *Fish Handling, Preservation and Processing in the Tropics*. Parts I, II. FAO.
4. Fennema K, Powrie WD & Marth EH. 1973. *Low Temperature Preservation of Foods and Living Matter*. Marcel Dekker.
5. Gopakumar K. (Ed.). 2002. *Text Book of Fish Processing Technology*. ICAR.
6. Hall GM. (Ed). 1992. *Fish Processing Technology*. Blackie.
7. Nambudiri DD. 2006. *Technology of Fishery Products*. Fishing Chimes.
8. Regenssein JM & Regenssein CE. 1991. *Introduction to Fish Technology*. VanNostrand Reinhold.
9. Rudolf K. 1969. *Freezing and Irradiation of Fish*. Fishing News (Books).
10. Sen DP. 2005. *Advances in Fish Processing Technology*. Allied Publ.

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous Assessment	-	-	10 (Based on Daily Performance only)
Final Practical Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) (Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.



RECOMMENDED READINGS

1. Fish Handling and Processing - Aitken A. et al.
2. Fish Handling and Processing - C.H.O. Bugese.
3. Fish Processing and Preservation - C. L. Cutting.
4. Fish Processing Technology - G. M. Hall.
5. Introduction to Fish Technology - J. M. Regenstein.
6. Sea Food Quality determination - D. E. Karamer and J. Listen.
7. Tropical Fishery Products - K. Gopakumar.
8. Fish and Fish Products - A. L. Winton and K. B. Winton.
9. Food Microbiology - M. R. Adams and M.O. Mass.
10. Recent Trends in Processing Low Cost Fish - K. K. Balachandran, P. A. Perigreen, P. Madhavan and P. K. Surendran.
11. Postharvest Technology of Fish and Fish Products - K. K. Balachandran.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2025, 2026 & 2027
(MAJOR COURSE)
UG SEMESTER-VI
UNDER NEP-2020

MAJOR CORE COURSE No.	:	UMJIFT-604
MAJOR CORE COURSE TITLE	:	BIOINSTRUMENTATION AND STATISTICS IN FISHERIES
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
iii) Continuous assessment	:	10
iv) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To provide information on various biochemical techniques in fish analysis and use of different instruments as well as Computers in various aspects of Fisheries

UNIT I: FISHERIES INSTRUMENTATION-I (13 Hrs.)

- 1.1 Structure, principles and applications of compound microscope.
- 1.2 Structure, principles and applications of Scanning electron microscope.
- 1.3 Structure, principles and applications of electron microscope.
- 1.4 Structure, principles and applications of centrifuges.

UNIT 2: FISHERIES INSTRUMENTATION-II (12 Hrs.)

- 2.1 Spectrophotometer - structure, principles and application
- 2.2 UV-VIS spectrophotometer and fluorescence spectroscopy
- 2.3 Structure, principles and applications of paper, gas and ion exchange chromatography
- 2.4 Structure, principles and applications of High Performance Liquid Chromatography (HPLC)

UNIT 3: COMPUTER APPLICATIONS IN FISHERIES (12 Hrs.)

- 3.1 Fundamentals of computers
- 3.2 Application of Microsoft (MS) Word, Excel and Power point presentation in Fisheries
- 3.3 Internet: applications and advantages in Fisheries
- 3.4 Modern computer techniques in Fisheries



**TITLE- BIOINSTRUMENTATION AND STATISTICS IN FISHERIES
COURSE CODE- UMJIFT 604**

UNIT 4: FISHERIES STATISTICS**(13 Hrs.)**

- 4.1 Elementary statistics - Definition, scope, objectives and applications in fisheries
 4.2 Mean, Median, Mode and standard deviation
 4.3 Population statistics – Concept, characteristics and distribution.
 4.4 Sample survey, census, sampling techniques, statistical tools and need for empirical and quantitative analysis.

Practicum**(30 Hrs.)**

1. Preparation of a temporary and permanent mount for microscopy
2. Study of Compound microscope
3. Study of electron microscope
4. Study and handling procedure of Centrifuge
5. Study and handling procedure of Spectrophotometer
6. Study and performance of chromatographic techniques
7. Structure, principles and applications of High Performance Liquid Chromatography (HPLC)
8. Study of Computer components and their functions

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A &B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3marks.

SectionB: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment(TotalMarks15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

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RECOMMENDED READINGS

1. Ewing GW. 1997. *Analytical Instrumentation Handbook*. Marcel Dekker. Jean IJ & Ikim WJ. 1995. *Analysis of Food for Nutrition Labeling and Hazard Contaminants*.
2. Marcel Dekker, Lampman P & Saunder K. 1979. *Introductory Spectroscopy*. College Publ.
3. Larsen BS & McEwen CN. 1988. *Mass Spectrometry of Biological Materials*. Marcel Dekker.
4. Pare JRJ & Belanger JMR. 1997. *Instrumental Methods in Food Analysis*. Elsevier.
5. Peary JA. 1981. *Introduction to Analytical Gas Chromatography*. Marcel Dekker.
6. Robyt JF & White BJ. 1990. *Biochemical Techniques - Theory and Practice*. Waveland Press.
7. Wilson K & Walker J. 2000. *Practical Biochemistry - Principles and Techniques*. Cambridge University Press.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2025, 2026 & 2027
(MINOR COURSE)
UG SEMESTER-VI
UNDER NEP-2020

MINOR CORE COURSE NO.	:	UMIIFT-605
MINOR CORE COURSE TITLE	:	FISH PROCESSING TECHNOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To provide information on various fish preservation techniques and by-products, utilization of fishery wastes and their nutritional value. To understand various aspects of quality assurance system, quality management and national / international certification system to learn factory sanitation and hygiene, water quality and standard

UNIT I: BIOCHEMICAL COMPOSITION AND FISH SPOILAGE (13 Hrs.)

- 1.1 Chemical composition of fish- moisture, ash, carbohydrates, proteins and lipids
- 1.2 Rigor mortis - freshness test and biochemical spoilage.
- 1.3 Role of microbes in fish spoilage,
- 1.4 Microbial analysis of (*Vibrio*, *Salmonella*, *Shigella*, *Staphylococcus* etc.) of fish and fish products.

UNIT 2: FISH PRESERVATION TECHNOLOGY (12 Hrs.)

- 2.1 Principles and importance of fish preservation
- 2.2 Traditional methods of fish preservation - Sundrying, smoking, chilling and salting
- 2.3 Canning process, steps involved, process flow, principles and process details
- 2.4 Freezing methods - Air-blast and plate freezer, drip loss and thawing of frozen fish.

UNIT 3: FISH PRODUCTS AND BYPRODUCTS (12 Hrs.)

- 3.1 Value added products - fish fingers, fish flakes, breaded battered minced products, etc.
- 3.2 Fish products and Byproducts: Fish silage, Fish meal, Fish manure, isinglass and Surimi
- 3.3 Fish protein concentrate: Different methods of production and different types
- 3.4 Fish body and liver oils: Extraction, purification, preservation and storage



UNIT 4: QUALITY ASSURANCE

(12 Hrs.)

- 4.1 Quality assessment of fish products - physical, chemical and microbiological quality standards.
- 4.2 Fish inspection in India, process water and product quality in fishery industry.
- 4.3 Hazard Analysis and Critical Control Point (HACCP) principles, practical aspects of planning and implementation
- 4.4 Quality control system, various national and international standards on fishery products (BS-5750 and ISO 9000).

Practicum

(30 Hrs.)

1. Identification of various fishes used for preparation of fisheries products and byproducts
2. Identification of various micro-organisms causing fish spoilage (*Vibrio, Salmonella, Shigella, Staphylococcus* etc.)
3. Fish preservation method of Sundrying
4. Fish preservation method of Smoking
5. Fish preservation method of Freezing
6. Canning and different types of cans
7. Fish products and Byproducts: Fish silage, Fish meal, Fish manure, isinglass
8. Method of production of Fish protein concentrate
9. Method of production Fish body and liver oils
10. To study Rigor mortis changes in a fish

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3marks.

SectionB: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12marks. Candidates are required to attempt four questions in all, selecting one from each unit.



Internal Assessment(TotalMarks15)

Fifteen(15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7marks and four short answer type questions of 2marks each.

RECOMMENDED READINGS

1. Fish Handling and Processing - Aitken A. et al.
2. Fish Handling and Processing - C.H.O. Bugese.
3. Fish Processing and Preservation - C. L. Cutting.
4. Fish Processing Technology - G. M. Hall.
5. Introduction to Fish Technology - J. M. Regenstein.
6. Sea Food Quality determination - D. E. Karamer and J. Listen.
7. Tropical Fishery Products - K. Gopakumar.
8. Fish and Fish Products - A. L. Winton and K. B. Winton.
9. Food Microbiology - M. R. Adams and M.O. Mass.
10. Recent Trends in Processing Low Cost Fish - K. K. Balachandran. P. A. Perigreen, P. Madhavan and P. K. Surendran.
11. Postharvest Technology of Fish and Fish Products - K. K. Balachandran.



UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES

For the Examination to be held in Year 2025, 2026 & 2027

INDUSTRIAL FISH & FISHERIES COURSE

UG SEMESTER VII

UNDER NEP-2020



University of Jammu
Syllabi of Industrial Fish and Fisheries for FYUGP under CBCS as per NEP-2020
SEMESTER-VII
(Examination to be held in 2025, 2026, 2027)

Major Course

Course Code: **UMJIFT701**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FINFISH AND SHELLFISH TAXONOMY**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT702**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **FINFISH AND SHELLFISH BIOLOGY**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT703**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **CAPTURE FISHERIES**
Total no. of lectures: Theory: 45 hours

Major Course

Course Code: **UMJIFT704**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **RESEARCH METHODOLOGY AND ETHICS**
Total no. of lectures: Theory: 45 hours

Minor Course

Course Code: **UMIIFT705**
Credits: 04 {03(Theory) + 01(Practical)}
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Course Title: **BIOLOGY OF FINFISHES AND SHELLFISHES**
Total no. of lectures: Theory: 45 hours



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2025, 2026 & 2027)
(MAJOR COURSE)

MAJOR CORE COURSE NO.	:	UMJIFT701
MAJOR CORE COURSE TITLE	:	FINFISH AND SHELLFISH TAXONOMY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous assessment	:	10
II) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course has been designed to understand identification and classification of commercially important finfishes and shellfishes by the students. The course objectives are to provide the students with an introductory knowledge of fish classification. The students will be required to identify common species available in and around their region using morphological keys. This is accomplished through lecture, class discussion and examination of selected specimens.

UNIT 1: BASICS OF TAXONOMY

(13 Hrs.)

- 1.1 Systematics, Taxonomy and Classification; Importance of taxonomy
- 1.2 Zoological Nomenclature, and its amendments and rules of Binomial Nomenclature
- 1.3 Zoo Bank and its policies
- 1.4 International Code of Fisheries Science

UNIT 2: METHODS IN TAXONOMY

(13 Hrs.)

- 2.1 Phylogeny and Zoo geography
- 2.2 Modern tools of taxonomy: Cytotaxonomy and Biochemical taxonomy
- 2.3 Basics of Identification of fish through auto-image processing
- 2.4 Basics of PCR based methods and DNA finger printing

UNIT 3: FINFISH TAXONOMY

(13 Hrs.)

- 3.1 Morphological, Morphometric and Meristic characteristics
- 3.2 Classification of modern fishes up to order and family levels
 - 3.2.1 Elasmobranchii (Cartilaginous fishes)
 - 3.2.2 Actinopterygii (Bony fishes)
- 3.3 Berg's classification of fishes up to order level
- 3.4 Nelson's classification of fishes up to order level



UNIT 4: SHELLFISH TAXONOMY

(10 Hrs.)

- 4.1 Classification of commercially important Arthropods up to order level: (Prawns and Crabs)
- 4.2 Classification of commercially important Mollusks up to order level: (Bivalves and Cephalopods)
- 4.3 Classification of commercially important Echinodermates up to order level: (Star fish and Sea Cucumbers)
- 4.4 Morphometric and meristic characteristics of freshwater prawn, *Palaemon*

Practicum

(30 Hrs.)

- 1. Collection and identification of local fishes
- 2. Collection and identification of local shell fishes
- 3. Museum survey of commercially important freshwater fishes through specimen/chart
- 4. Museum survey of commercially important marine water fishes through specimen/chart
- 5. Basic principles of preservation
- 6. Morpho-meristic characteristics of fishes
- 7. Morpho-meristic characteristics of shellfishes
- 8. Chart/ Model preparation of Berg's classification of fishes upto order level
- 9. Chart/ Model preparation of Nelson's classification of fishes upto order level
- 10. Visit to local fish landing centers

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.



RECOMMENDED READINGS.

1. Mayr E. 1977. Principles of Systematic Zoology. Tata McGraw Hill Publishing Co. Ltd. New Delhi,
2. Michael M Cox and David L Nelson. 2010. Leninger Principles of Biochemistry, Fifth Edition. W.H. Freeman and company, New York.
3. Moyle PB and JR Cech. 1996. Fishes – An Introduction to Ichthyology. Prentice Hall Inc. N. Jersey, 594p. • Munro ISR. 2000. The Marine and Freshwater Fishes of Ceylon. Narendra Publishing house, New Delhi.
4. Nelson JS. 2006. Fishes of the World, IVth edition, John Weily and sons.
5. Ponniah AG and George John. 1998. Fish Chromosome Atlas. National Bureau of Fish Genetic Resources (NBFGR), Lucknow publication.
6. Poutiers JE. 1998. Bivalves; Gastropods. In: K. E. Carpenter, V H. Niem (eds.), FAO species identification guide for fisheries purposes. The living marine Resources of the Western Central Pacific. Volume I. Seaweeds, corals, bivalves And gastropods.FAO, Rome, ISBN 92-5-104051-6.
7. Raje SG, S Sivakami, G Mohanraj, PP Manojkumar, A Raju and KK Joshi. 2007. An atlas of the elasmobranch fishery resources of India. CMFRI special Publication.
8. Subramaniam TV, KR Karandikar and NN Murthy. 1949. Marine Pelecypods of Bombay Part I. J. Bombay University.
9. Subramaniam TV, KR Karandikar and NN Murthy. 1951. Marine Gastropods of Bombay Part I. J. Bombay University. Vol 3. 21-34.
10. Subramaniam TV, KR Karandikar and NN Murthy. 1952. Marine Gastropods of Bombay Part II. J. Bombay University. Vol 21. 26-73.
11. Talwar PK and Jhingran AG. 1991. Inland fishes of India and adjacent countries, Delhi Oxford and IBH Publishing Co.Pvt. Ltd. 1158 p. Vol. I and II
12. Talwar PK and Kacker RK. 1984. Commercial Sea Fishes of India. Published by ZSI, Kolkata. 997



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2025, 2026 & 2027)

(MAJOR COURSE)
UG SEMESTER-VII

MAJOR CORE COURSE NO.	:	UMJIFT-702
MAJOR CORE COURSE TITLE	:	FINFISH AND SHELLFISH BIOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course includes life events of fishes and shellfishes with relation to their food and feeding habits, age and growth, maturation and reproductive strategies followed by the study of embryonic and larval development in certain aquatic animals.

UNIT I: FEEDING BIOLOGY OF FINFISHES AND SHELLFISHES (12 Hrs.)

- 1.1 Food and feeding habits of finfishes-categories of food, major fish feeding types
- 1.2 Feeding adaptations in fishes-lips, teeth and gill rakers
- 1.3 Food and feeding habits of crustaceans- Freshwater prawn, crabs and lobsters
- 1.4 Food and feeding habits of mollusks- clams, oysters and mussels

UNIT 2: REPRODUCTIVE BIOLOGY OF FINFISHES AND SHELLFISHES (12 Hrs.)

- 2.1 Sexual maturity stages in teleosts (male and female)
- 2.2 Reproductive methods, sexual characters and sexual dimorphism in fishes
- 2.3 Reproductive habits of crustaceans- Freshwater prawn, crabs and lobsters
- 2.4 Reproductive habits of mollusks- clams, oysters and mussels

UNIT 3: DEVELOPMENT BIOLOGY OF FINFISHES (12 Hrs.)

- 3.1 Types of fish eggs, types and methods of spawning and fecundity
- 3.2 Embryonic development in fishes
- 3.3 Larval development in fishes
- 3.4 Parental care in fishes (nest, substrate and burrow spawners; external carriers and bearers)



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UNIT 4: DEVELOPMENT BIOLOGY OF SHELLFISHES

(12 Hrs.)

- 4.1 Early development of shrimps (Eggs, Nauplius, Protozoa, Mysis and Postlarva)
- 4.2 Development stages in cephalopods (ontogeny of Sepia)
- 4.3 Larval development in mollusks
- 4.4 Larval development in sea urchin

Practicum

(30 Hrs.)

- 1. Identification of fish eggs (Fresh water carps and Trouts)
- 2. Study of mouth part modification in fishes through charts and models
- 3. Study of maturity stages in teleosts through slides/charts
- 4. Embryonic development in teleosts
- 5. Metamorphosis in *Catla catla*
- 6. Life cycle of shrimps
- 7. Life cycle of sea urchin
- 8. Larval development in molluscs
- 9. Estimation of fish fecundity
- 10. Study of different nests built by fishes

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.



RECOMMENDED READINGS

1. Barrington EJW. 1981. Invertebrate Structure and Function. 2nd Ed. The English Language Book Society and Nelson.
2. Diwan AP and Dhakad NK. 2004. Embryology of Fishes. Recent Advances in Embryology Series-1. Anmol Publ.
3. Ede DA. 1978. An Introduction to Developmental Biology. Blackie.
4. Hoar WS and Randall J. (Ed.). 1988. Fish Physiology. Vol XI. The Physiology of Developing Fish. Part B. Viviparity and Post hatching Juveniles. Academic Press.
5. Jobling M. 1995. Environmental Biology of Fishes. Chapman and Hall.
6. Khan SA, Raffi SM and Lyla PS. 2003. Larvae of Decapod Crustaceans. Centre of Advanced Study in Marine Biology, Parangipettai, TamilNadu.
7. Khanna, S.S. (1980) Introduction to fishes, Surjeet Publications
8. Kyle, H. (2006) The biology of fishes, Sidgewick and Jackson
9. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
10. Srivastava, C.B.L (2006) A textbook of Fishery science and Indian fisheries, KitabMahal
11. Silas EG. 1983. Development of Penaeid Prawns. CMFRI Bull. No. 28
12. Werner A. Muller, 1996. Developmental Biology, Springer. 328p



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2025, 2026 & 2027)
(MAJOR COURSE)
UG SEMESTER-VII

MAJOR CORE COURSE No.	:	UMJIFT-703
MAJOR CORE COURSE TITLE	:	CAPTURE FISHERIES
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) - Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To understand the present status, exploitation and future potential of inland and marine capture fisheries. To learn the methodologies for assessments of Fisheries Resources and ways of capture

UNIT 1: INLAND CAPTURE FISHERIES RESOURCES (13 Hrs.)

- 1.1 Present status of inland fish catch in world
- 1.2 Inland capture fisheries resources of India
- 1.3 Riverine fisheries with special reference to Ganga, Brahmaputra, Indus, East and west coast river system
- 1.4 Fisheries resources of Jammu and Kashmir

UNIT 2: BRACKISHWATER FISHERIES RESOURCES (12 Hrs.)

- 2.1 Origin, Ecology and productivity of estuaries
- 2.2 Brackish watercapture fisheries resources of India
 - 2.2.1 Chilka lake
 - 2.2.2 Pulicat lake
 - 2.2.3 Hooghly Matlah estuary
- 2.3 Important finfishes of Indian brackish waters- Hilsa and Mulletts
- 2.4 Important shellfishes of Indian brackish waters- Prawns, Crabs, Lobsters and Mussels

UNIT 3: MARINE FISHERIES RESOURCES (12 Hrs.)

- 3.1 Present status of marine fish catch in world
- 3.2 Marine fisheries resources of India
 - 3.2.1 Inshore fisheries



3.2.2 Off- shore fisheries

3.3 Important finfishes of Indian marine waters- Oil sardines, Bombay duck and Tuna

3.4 Concept of EEZ and CRZ

UNIT 4: MANAGEMENT OF CAPTURE FISHERIES RESOURCES (12 Hrs.)

4.1 Conservation of capture fisheries resources

4.2 Factors affecting fish population- Fish wars and Overfishing

4.3 Regulations of fishing gears used in capturing fishes- Gillnet, Trawl net, seines and cast net

4.4 Concept of MSY (Maximum Sustainable Yield) and MEY (Maximum Economic Yield)

Practicum (30 Hrs.)

1. Museum survey of commercially important captured freshwater finfishes
2. Museum survey of commercially important captured freshwater shellfishes
3. Museum survey of commercially important captured brackish water finfishes
4. Museum survey of commercially important captured brackish water shellfishes
5. Museum survey of commercially important captured marine water finfishes
6. Museum survey of commercially important captured marine water shellfishes
7. Important fishing gears their construction and working- Gillnet, Trawl net, seines and cast net
8. Map study of important capture fisheries water resources of India
9. Collection of important native fish species of Jammu province
10. Visit to fish landing centres

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous Assessment	-	-	10 (Based on Daily Performance only)
Final Practical Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.



4.5

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Blaber, J.M. 1997. Fish and Fisheries in Tropical Estuaries. Chapman & Hall.
2. Cowx, I.G. 1996. Stock assessment in Inland Fisheries. Fishing News Books, Oxford, 513pp.
3. FAO 1999. Fish and Fisheries at Higher Altitudes: Asia FAO Fisheries Technical paper No. 385.
4. FAO (2012). The State of World Fisheries and Aquaculture. FAO Fisheries and Aquaculture Department, FAO, Rome (<http://www.fao.org/docrep/016/i2727e/i2727e00.htm>)
5. Gulland, J.A. 1983. Fish Stock Assessment. A Manual of Basic Methods. Vol. 1. John Wiley & Sons, NY, 223 pp.
6. ICAR 2011. Handbook of Fisheries and Aquaculture. ICAR, New Delhi, 1116 pp.
7. Jhingran, V.G. 1991. Fish and Fisheries of India. Hindustan Publishing Co., Delhi, 727 pp.
8. Jhingran, V.G. and K.L. Sehgal. 1978. Cold Water Fisheries of India. J.Inland. Fish. Soc. India. Sp. Publ.
9. Khanna, D.R., R. Rajani, G. Matta. 2011. Ecology of Fish Pond. Daya Publishing House, New delhi, 173pp.
10. Sakhare, V.B. 2012. Inland fisheries. Daya publishing house, Delhi, 326pp.
11. Sansbury, J.C. 1986. Commercial Fishing Methods. An Introduction to Vessels and Gears. 2 nd ed. Fishing News Books Ltd., England, 207 pp.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH AND FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2025, 2026 & 2027)
(MAJOR COURSE)
UG SEMESTER-VII

MAJOR CORE COURSE NO.	:	UMJIFT704
MAJOR CORE COURSE TITLE	:	RESEARCH METHODOLOGY AND ETHICS
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
iii) Continuous assessment	:	10
iv) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

After successful completion of the course the students will have knowledge about research formulation, thesis and paper writing and will have awareness about the publication ethics and publication misconducts.

UNIT-1: FUNDAMENTALS OF RESEARCH **(13 Hrs.)**

- 1.1 Research: concept and Objectives.
- 1.2 Types of research: Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical
- 1.3 Research methodology.
 - 1.3.1 Defining and formulating the research problem.
- 1.4 Selecting the problem - Necessity of defining the problem.

UNIT-2: RESEARCH FORMULATION **(10 Hrs.)**

- 2.1 Literature review: methods of writing review of literature
 - 2.1.1 Primary and secondary sources of review of literature
 - 2.1.2 Reviews & treatise.
 - 2.1.3 Monographs
- 2.2 Patents and its significance.
 - 2.2.1 Web as a source – searching the web.
 - 2.2.2 Critical literature review.
- 2.3 Identifying gap areas from literature review.
 - 2.3.1 Development of working hypothesis.



UNIT-3: RESEARCH DESIGN AND METHODS

(10 Hrs.)

- 3.1 Research design – Basic Principles- Need of research design.
 - 3.1.1 Features of good design.
 - 3.1.2 Observation and Facts and explanation.
- 3.2 Induction, Deduction, Development of Models.
- 3.3 Developing a research plan - Exploration, Description, Diagnosis, Experimentation.
- 3.4 Determining experimental and sample designs.

UNIT-4: THESIS WRITING & ETHICS

(12 Hrs.)

- 4.1 Structure and components of scientific reports.
 - 4.1.1 Types of report – Technical reports and thesis – Significance.
 - 4.1.2 Different steps in the preparation.
- 4.2 Ethics with respect to science and research
- 4.3 Intellectual property right (IPR)
 - 4.3.1 Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP).
 - 4.3.2 Selective reporting and misrepresentation of data.
 - 4.3.3 Conflicts of interest - Publication misconduct.
- 4.4 Violation of publication ethics, authorship and contributor ship - Identification of publication misconduct, complaints & appeals and consequences.

PRACTICALS

(30 Hrs.)

1. Selection and reparation of research topic based on fish and fisheries
2. To write review on any relevant topic of fish and fisheries
3. Demonstration of difference between research and review paper.
4. Preparation of articles on current topics of fish and fisheries
5. Demonstration of IPR and its significance.
6. To write technical report on any topic of fish and fisheries.
7. To write bibliography for research paper.
8. To write acknowledgment in research and review paper.

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15



External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Nicholas H. Steneck. Introduction to the Responsible Conduct of Research. Office of Research Integrity. 2007.
2. The Student's Guide to Research Ethics By Paul Oliver Open University Press, 2003
3. Responsible Conduct of Research By Adil E. Shamoo; David B. Resnik Oxford University Press, 2003
4. Ethics in Science Education, Research and Governance Edited by Kambadur Muralidhar, Amit Ghosh Ashok Kumar Singhvi. Indian National Science Academy, 2019. ISBN : 978-81-939482-1-1-Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
5. Bijorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
6. Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008
7. Graziano, A., M., and Raulin, M., L.: Research Methods – A Process of Inquiry, Sixth Edition, Pearson, 2007

WEB REFERENCES

1. <https://ori.hhs.gov/sites/default/files/rcrintro.pdf>.
2. <https://www.enago.com/academy/what-are-the-ethical-considerations-in-research-design/#:~:text=The%20research%20design%20must%20address,specifically%20to%20the%20research%20questions.>
3. <https://www.scribbr.com/methodology/research-ethics/>.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH AND FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2025, 2026 & 2027)
(MINOR COURSE)
UG SEMESTER-VII

MINOR CORE COURSE NO.	:	UMIIFT-705
MINOR CORE COURSE TITLE	:	BIOLOGY OF FINFISHES AND SHELLFISHES
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course includes life events of fishes and shellfishes with relation to their food and feeding habits, age and growth, maturation and reproductive strategies followed by the study of embryonic and larval development in certain aquatic animals.

UNIT I: FEEDING BIOLOGY OF FINFISHES AND SHELLFISHES (12 Hrs.)

- 1.3 Food and feeding habits of finfishes-categories of food, major fish feeding types
- 1.4 Feeding adaptations in fishes-lips, teeth and gill rakers
- 1.3 Food and feeding habits of crustaceans- Freshwater prawn, crabs and lobsters
- 1.4 Food and feeding habits of mollusks- clams, oysters and mussels

UNIT 2: REPRODUCTIVE BIOLOGY OF FINFISHES AND SHELLFISHES (12 Hrs.)

- 2.1 Sexual maturity stages in teleosts (male and female)
- 2.2 Reproductive methods, sexual characters and sexual dimorphism in fishes
- 2.3 Reproductive habits of crustaceans- Freshwater prawn, crabs and lobsters
- 2.4 Reproductive habits of mollusks- clams, oysters and mussels

UNIT 3: DEVELOPMENT BIOLOGY OF FINFISHES (12 Hrs.)

- 3.1 Types of fish eggs, types and methods of spawning and fecundity
- 3.2 Embryonic development in fishes
- 3.3 Larval development in fishes
- 3.4 Parental care in fishes (nest, substrate and burrow spawners; external carriers and bearers)

UNIT 4: DEVELOPMENT BIOLOGY OF SHELLFISHES (12 Hrs.)

- 4.1 Early development of shrimps (Eggs, Nauplius, Protozoa, Mysis and Postlarva)
- 4.2 Development stages in cephalopods (ontogeny of Sepia)
- 4.3 Larval development in mollusks
- 4.4 Larval development in sea urchin

PRACTICUM (30 Hrs.)

1. Identification of fish eggs (Fresh water carps and Trouts)
2. Study of mouth part modification in fishes through charts and models
3. Study of maturity stages in teleosts through slides/charts
4. Embryonic development in teleosts
5. Metamorphosis in *Catla catla*
6. Life cycle of shrimps
7. Life cycle of sea urchin
8. Larval development in molluscs
9. Estimation of fish fecundity
10. Study of different nests built by fishes

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.



RECOMMENDED READINGS

1. Barrington EJW. 1981. Invertebrate Structure and Function. 2nd Ed. The English Language Book Society and Nelson.
2. Diwan AP and Dhakad NK. 2004. Embryology of Fishes. Recent Advances in Embryology Series-1. Anmol Publ.
3. Ede DA. 1978. An Introduction to Developmental Biology. Blackie.
4. Hoar WS and Randall J. (Ed.). 1988. Fish Physiology. Vol XI. The Physiology of Developing Fish. Part B. Viviparity and Post hatching Juveniles. Academic Press.
5. Jobling M. 1995. Environmental Biology of Fishes. Chapman and Hall.
6. Khan SA, Raffi SM and Lyla PS. 2003. Larvae of Decapod Crustaceans. Centre of Advanced Study in Marine Biology, Parangipettai, TamilNadu.
7. Khanna, S.S. (1980) Introduction to fishes, Surjeet Publications
8. Kyle, H. (2006) The biology of fishes, Sidgewick and Jackson
9. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
10. Srivastava, C.B.L (2006) A textbook of Fishery science and Indian fisheries, KitabMahal
11. Silas EG. 1983. Development of Penaeid Prawns. CMFRI Bull. No. 28
12. Werner A. Muller, 1996. Developmental Biology, Springer. 328p



UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES

For the Examination to be held in Year 2026, 2027 & 2028

INDUSTRIAL FISH & FISHERIES COURSE

UG SEMESTER VIII (HONOURS)

UNDER NEP-2020

University of Jammu

Syllabi of Industrial Fish and Fisheries for FYUGP under CBCS as per NEP-2020

SEMESTER-VIII (HONOURS)

(Examination to be held in 2026, 2027 & 2028)

Major Course

Course Code: **UMJIFT-801** Course Title: **FINFISH AND SHELLFISH ANATOMY**
Credits: 04 {03(Theory) + 01(Practical)} Total no. of lectures: Theory: 45 hours
Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Major Course

Course Code: **UMJIFT-802** Course Title: **FINFISH AND SHELLFISH PHYSIOLOGY**
Credits: 04 {03(Theory) + 01(Practical)} Total no. of lectures: Theory: 45 hours
Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Major Course

Course Code: **UMJIFT-803** Course Title: **AQUATIC ECOLOGY**
Credits: 04 {03(Theory) + 01(Practical)} Total no. of lectures: Theory: 45 hours
Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Major Course

Course Code: **UMJIFT-804** Course Title: **FISHERIES ECONOMICS**
Credits: 04 {03(Theory) + 01(Practical)} Total no. of lectures: Theory: 45 hours
Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Minor Course

Course Code: **UMIIFT-805** Course Title: **AQUATIC BIODIVERSITY**
Credits: 04 {03(Theory) + 01(Practical)} Total no. of lectures: Theory: 45 hours
Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2026, 2027 & 2028)
(MAJOR COURSE)

MAJOR CORE COURSE NO.	:	UMJIFT-801
MAJOR CORE COURSE TITLE	:	FINFISH AND SHELLFISH ANATOMY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course has been designed to have enhanced knowledge on anatomical features of a finfishes and shellfishes. They will be able to distinguish the external and internal anatomy of various fishes and shellfishes and will understand the functions of important internal organs and their role in different systems

UNIT – 1:EXTERNAL ANATOMY OF FINFISHES (13 Hrs.)

- 1.1 External anatomy of finfish-body forms, coverings
- 1.2 Structure of fins- paired and unpaired
- 1.3 Skin and scales- cycloid, ctenoid, ganoid and placoid scales
- 1.4 Modification in the shape of mouth- superior, inferior and terminal modifications

UNIT –2:INTERNAL ANATOMY OF FINFISHES (13 Hrs.)

- 2.1 Anatomy of circulatory system- Heart and Arterial system in elasmobranchs
- 2.2 Anatomy of respiratory system- Gills and accessory respiratory organs
- 2.3 Anatomy of nervous system- Brain and nerves
- 2.4 Anatomy of digestive system- Alimentary canal and associated digestive glands

UNIT 3: EXTERNAL ANATOMY OF SHELLFISHES (13 Hrs.)

- 3.1 Morphological characteristics of Arthropods
- 3.2 External anatomy of shrimps- *Palaemon*, Lobster and Crabs
- 3.3 Morphological characteristics of molluscs
- 3.4 External anatomy of molluscs- *Unio*, *Loligo*, *Sepia*



UNIT 4: INTERNAL ANATOMY OF SHELLFISHES

(10 Hrs.)

- 4.1 Anatomy of digestive system of *Palaemon* and *Unio*
- 4.2 Anatomy of respiratory system of *Palaemon* and *Unio*
- 4.3 Anatomy of reproductive system of *Palaemon* and *Unio*
- 4.4 Pearl formation in mollusks

Practicum

(30 Hrs.)

- 1. To study the anatomy of digestive system of *Cyprinus carpio*
- 2. To study the anatomy of gills in fishes
- 3. To study the anatomy of accessory respiratory organs in fishes
- 4. To study the anatomy of digestive system of fishes and prawns
- 5. To study the anatomy of respiratory system of fishes and prawns
- 6. To study the structure and dissection of different scales from fishes
- 7. To study the anatomy of reproductive system of fishes and prawns
- 8. To dissect and study the appendages of prawn
- 9. Museum survey of commercially important fishes, arthropods and mollusks
- 10. Study of mouth parts of fishes through charts/ models

NOTE FOR PAPER SETTING

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External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.



Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS.

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2. Khan SA, Raffi SM and Lyla PS. 2003. Larvae of Decapod Crustaceans. Centre of Advanced Study in Marine Biology, Parangipettai, TamilNadu.
3. Khanna, S.S. (1980) Introduction to fishes, Surjeet Publications
4. Kyle, H. (2006) The biology of fishes, Sidgewick and Jackson
5. Mayr E. 1977. Principles of Systematic Zoology. Tata McGraw Hill Publishing Co. Ltd. New Delhi,
6. Michael M Cox and David L Nelson. 2010. Leninger Principles of Biochemistry, Fifth Edition. W.H. Freeman and company, New York.
7. Moyle PB and JR Cech. 1996. Fishes – An Introduction to Ichthyology. Prentice Hall Inc. N. Jersey, 594p. • Munro ISR. 2000. The Marine and Freshwater Fishes of Ceylon. Narendra Publishing house, New Delhi.
8. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
9. Srivastava, C.B.L (2006) A textbook of Fishery science and Indian fisheries, KitabMahal
10. Silas EG. 1983. Development of Penaeid Prawns. CMFRI Bull. No. 28
11. Werner A. Muller, 1996. Developmental Biology, Springer. 328p



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SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
UNDER CBCS AS PER NEP - 2020
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(MAJOR COURSE)

MAJOR CORE COURSE NO.	:	UMJIFT-802
MAJOR CORE COURSE TITLE	:	FINFISH AND SHELLFISH PHYSIOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

After successful completion of the course the students will: be able to develop an understanding of the role of physiology in study of fishes. They will gain skills in fish physiological aspects including regulatory mechanisms.

UNIT 1: FINFISH PHYSIOLOGY-I

(12 Hrs.)

- 1.1 Physiology of gas exchange and respiration in fishes
- 1.2 Physiology of digestion in fishes
- 1.3 Physiology of blood circulation in fishes
- 1.4 Physiology of excretion in fishes

UNIT 2: FINFISH PHYSIOLOGY-II

(12 Hrs.)

- 2.1 Physiology of osmoregulation in freshwater and marine water fishes
- 2.2 Reproductive physiology in male teleostan fishes
- 2.3 Reproductive physiology in female teleostan fishes
- 2.4 Internal ear (membranous labyrinth) - Structure and functions.

UNIT 3: SHELLFISH PHYSIOLOGY-I (ARTHROPODS)

(12 Hrs.)

- 3.1 Physiology of respiration in shellfishes- *Palaemon*
- 3.2 Physiology of digestion in shellfishes- *Palaemon*
- 3.3 Physiology of blood circulation in shellfishes- Lobster
- 3.4 Physiology of excretion in shellfishes- Crab



UNIT 4: SHELLFISH PHYSIOLOGY-II (MOLLUSKS)

(12 Hrs.)

- 4.1 Physiology of respiration in mollusks- *Unio*
- 4.2 Physiology of digestion in in mollusks- *Unio*
- 4.3 Physiology of blood circulation in in mollusks- *Loligo*
- 4.4 Physiology of excretion in in mollusks- *Sepia*

(30 Hrs.)

Practicum

1. Histology of alimentary canal of herbivorous, carnivorous and omnivorous fishes
2. Histology of digestive system of *Unio and Palaemon*
3. Histology of gills and accessory respiratory organs in fishes
4. Dissection of *Scoliodon* to extract afferent and efferent arteries
5. Histology of hepatopancreas in prawns
6. To prepare the permanent mount of testis of fishes
7. To prepare the permanent mount of ovaries of fishes
8. To prepare the permanent mount of kidneys of fishes
9. To estimate the gastro-somatic index of a given fish
10. To estimate the pH of water sample

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.



Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Barrington EJW. 1981. Invertebrate Structure and Function. 2nd Ed. The English Language Book Society and Nelson.
2. Cyrino EP and Bureau D and Kapoor BG. 2008. Feeding and Digestive Functions in Fishes. Science Publ.
3. D' Abramo LR, Conklin DE and Akiyama DM. 1977. Crustacean Nutrition: Advances in Aquaculture. Vol. VI. World Aquaculture Society, Baton Rouge.
4. De Silva SS and Anderson TA. 1995. Fish Nutrition in Aquaculture. Chapman and Hall Aquaculture Series
5. Finn RN and Kapoor BG. 2008. Fish Larval Physiology. Science Publ.
6. Farrell AP 2011. Encyclopedia of fish physiology Vol. I-III. Academic Press.
7. Hara TJ and Zielinski BS. 2014. Sensory systems neuroscience. Fish physiology series Vol. 25, Elsevier Publ.
8. Hoar WS, Randall DJ and Donaldson EM. 2014. Fish Physiology Vol. 9 A Reproduction: Endocrine Tissues and Hormones. Academic Press • Hoar WS. 2014. Fish Physiology Vol. 9B. Academic Press.
9. Modayil MJ and Diwan AD. 2007. Physiology of marine white shrimp *Litopenaeus setiferus*. • Norris DO and Lopez KH. 2011. Hormones and Reproduction of Vertebrates. Vol. I Fishes. Academic Press.
10. Perry SF, Tufts BL. 2014. Fish respiration, Fish physiology series, Vol. 17. Elsevier Publ.
11. Samantaray K. 2015. Physiology of finfish and shellfish. New India Publ. Agency
12. Shashikala KB, Sahoo AK. 2018. Histology of Indian Major Carps - A Colour Atlas.



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UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2026, 2027 & 2028)
(MAJOR COURSE)

MAJOR CORE COURSE No.	:	UMJIFT-803
MAJOR CORE COURSE TITLE	:	AQUATIC ECOLOGY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To gain theoretical and practical knowledge about fundamental and advanced aspects of aquatic ecology. It is a general introduction to freshwater, brackishwater and marine ecology. The course covers aquatic systems of the world, properties of water, biodiversity and diversification of aquatic organisms and adaptations to aquatic life.

UNIT 1: INTRODUCTION TO AQUATIC ECOLOGY (13 Hrs.)

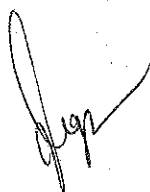
- 1.1 Ecology- Definition, concept and branches
- 1.2 Ecological hierarchy, organization and components
- 1.3 Ecological factors effecting aquatic ecosystem – Temperature, light, currents and food
- 1.4 Ecological classification of fishes - Stenohaline, Euryhaline, Stenothermal, Eurythermal and Rheophilic fishes

UNIT 2: ECOLOGICAL COMMUNITIES (12 Hrs.)

- 2.1 Biological communities of aquatic ecosystem – plankton, nekton, neuston and benthos
- 2.2 Food chains operating in aquatic ecosystem
- 2.3 Productivity of aquatic ecosystem – primary, gross and net productivity
- 2.4 Energy flow in aquatic ecosystem

UNIT 3: FRESHWATER ECOLOGY (12 Hrs.)

- 3.1 Origin and classification of lentic habitat
- 3.2 Thermal stratification of lakes
- 3.2 Ecology of lotic habitats
- 3.3 Characteristics of hill streams and adaptations of hill stream fishes
- 3.4 Importance of wetlands



UNIT 4: COASTAL ECOLOGY**(12 Hrs.)**

- 4.1 Estuaries- Classification, characteristics and biota
 4.2 Coral reef ecosystem
 4.3 Flora and fauna of mangroves
 4.4 Conservation of Aquatic ecology- measures and laws

Practicum**(30 Hrs.)**

1. Collection, preservation and estimation of phytoplankton and zooplankton
2. Periphyton estimation.
3. Identification and classification of various phytoplankton and zooplankton.
4. Mass culture of Phytoplankton and zooplankton.
5. Preparation of permanent slide and sectioning
6. Collection and identification of flora and fauna from different ecosystems.
7. Calculation of biodiversity indices – Shannon-Wiener index; Simpson index, Hill index etc.
8. Estimation of physico-chemical parameters of different water bodies
9. Visit to different spots of fish biodiversity
10. Chart preparation and slogan display to conserve aquatic biodiversity

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous Assessment	-	-	10 (Based on Daily Performance only)
Final Practical Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Barnes RSK and Mann KH. eds. 2009. Fundamentals of aquatic ecology. John Wiley and Sons.
2. Carter RWG. 1998. Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines. Academic Press, London.
3. Closs,G., Downes,B. and Boulton, A. 2004 "Freshwater Ecology : A Scientific Introduction"
4. Day,S. and Nasrin,B. 2014"Ecology of Aquatic Systems"
5. Dodds W and Whiles M. 2010. Freshwater Ecology, 2nd Edition, Concepts and Environmental Application of Limnology. Academic Press, London.
6. Kormondy EJ. 1986. Concepts of Ecology, Prentice-Hall, New Delhi.
7. Odum, E.P, 1987 " Basic Ecology"
8. Okuda N, Watanabe K, Fukumori K, Nakano SI and Nakazawa T. 2014. Biodiversity in aquatic systems and environments: Lake Biwa. Springer Japan.
9. Park CC. 1980: Ecology and Environmental Management. Butterworths, London.
10. Qasim, S.Z, 1999 "Indian Ocean – images and realities"
11. Verma, P.S. and Agarwal,A.K 2000"Environmental Biology : Principles of Ecology"



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UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2026, 2027 & 2028)
(MAJOR COURSE)

MAJOR CORE COURSE NO.	:	UMJIFT-804
MAJOR CORE COURSE TITLE	:	FISHERIES ECONOMICS
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
iii) Continuous assessment	:	10
iv) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To familiarize the student with the evolution, growth and performance of Indian fisheries trade in international context and to acquaint them with the knowledge of different economics terminology especially law of demand, supply, returns and also fish financing institutes.

UNIT 1: INTRODUCTION TO ECONOMICS

(13 Hrs.)

- 1.1 Principles of economics: Definition, subject matter and scope of economics
- 1.2 Positive and normative economics, environmental economics, resource, scarcity.
- 1.3 Production Contribution of fisheries sector to the economic development of the country.
- 1.4 Economics of Integrated fisheries, Composite fish culture and Intensive fish culture

UNIT 2: MICRO ECONOMICS

(12 Hrs.)

- 2.1 Demand-Law of demand, elasticity of demand and demand curve
- 2.2 Supply- Law of supply, elasticity of supply and supply curve
- 2.3 Law of equimarginal and diminishing returns
- 2.4 Reservoir fisheries in India

UNIT 3: FISH MARKETING

(12 Hrs.)

- 3.1 Fish markets- types and problems
- 3.2 Price determination-markets and prices, types of competitions
- 3.3 Role of MPEDA in fisheries export market
- 3.4 Fisheries co-operatives- Functions, financial assistance, input supplies and marketing of fish



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UNIT 4:FISH FINANCE

(13 Hrs.)

- 4.1 Administration - Fishery administration at the Centre and States,
4.2 NABARD- its structure and functions in relation to fisheries economics
4.3 Contribution of Indian fisheries to GNP and employment
4.4 Exclusive Economic Zone (EEZ) and Coastal Regulation Zone (CRZ), their effect in fishery economy.

Practicum

(30 Hrs.)

1. Collection of commercially important fish species
2. Market survey of the local fishermen and preparation of report
3. Market survey of ornamental fish suppliers
4. Derivation and graph plotting of Demand curve
5. Derivation and graph plotting of supply curve
6. Derivation of Law of demand
7. Derivation of Law of supply
8. Derivation of Law of diminishing returns
9. Derivation of Law of equimarginal return
10. Study and chart preparations of different marketing channels

NOTE FOR PAPER SETTING

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Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.



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Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. FAO. Globefish Commodity Updates. Rome (Various years).
2. Francis C. 2008. International Economics. Tata McGraw Hill.
3. Henry Thompson. 2010. International Economics. World Scientific Publishing Co.
4. Jain Khushpat S. 2012. Export Import Procedures and Documentation. Himalaya Publishing House
5. Krugman PR & Obstfeld M. 1991. International Economics: Theory and Policy. Harper Collins Publ.
6. McGraw Hill. Dennis A. 2001. Trade Theory and Practice. Irwin Publ.
7. Ministry of Agriculture. Handbook of Fisheries Statistics. New Delhi (Various years).
8. Mithani JP. 1998. International Economics. Tata McGraw Hill.
9. Oscar JB. 1999. Export Competitiveness in South-East Asia; Policy Initiatives and Corporate Actions in Marine Products Industry. Wheeler Publ.
10. Porter G. 1998. Fisheries Subsidies – Over fishing and Trade. Geneva



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MINOR CORE COURSE NO.	:	UMIIFT-805
MINOR CORE COURSE TITLE	:	AQUATIC BIODIVERSITY
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
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I) External (University Exam)	:	60
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OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To impart students the theoretical and practical knowledge of fundamental and advanced aspects of aquatic ecology. It is a general introduction to freshwater, brackishwater and marine ecology. The course covers aquatic systems of the world, properties of water, biodiversity and diversification of aquatic organisms and adaptations to aquatic life.

UNIT 1: INTRODUCTION TO AQUATIC ECOLOGY

(13 Hrs.)

1.3 Ecology- Definition, concept and branches

1.4 Ecological hierarchy, organization and components

1.3 Ecological factors effecting aquatic ecosystem – Temperature, light, currents and food

1.4 Ecological classification of fishes - Stenohaline, Euryhaline, Stenothermal, Eurythermal and Rheophilic fishes

UNIT 2: ECOLOGICAL COMMUNITIES

(12 Hrs.)

2.1 Biological communities of aquatic ecosystem – plankton, nekton, neuston and benthos

2.2 Food chains operating in aquatic ecosystem

2.3 Productivity of aquatic ecosystem – primary, gross and net productivity

2.4 Energy flow in aquatic ecosystem

UNIT 3: FRESHWATER ECOLOGY

(12 Hrs.)

3.1 Origin and classification of lentic habitat

3.2 Thermal stratification of lakes



3.2 Ecology of lotic habitats

3.3 Characteristics of hill streams and adaptations of hill stream fishes

3.4 Importance of wetlands

UNIT 4: COASTAL ECOLOGY

(12 Hrs.)

4.1 Estuaries- Classification, characteristics and biota

4.2 Coral reef ecosystem

4.3 Flora and fauna of mangroves

4.4 Conservation of Aquatic ecology- measures and laws

Practicum

(30 Hrs.)

1. Collection, preservation and estimation of phytoplankton and zooplankton
2. Periphyton estimation.
3. Identification and classification of various phytoplankton and zooplankton.
4. Mass culture of Phytoplankton and zooplankton.
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6. Collection and identification of flora and fauna from different ecosystems.
7. Calculation of biodiversity indices – Shannon-Wiener index; Simpson index, Hill index etc.
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Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.



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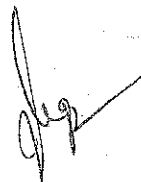
Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Barnes RSK and Mann KH. eds. 2009. Fundamentals of aquatic ecology. John Wiley and Sons.
2. Carter RWG. 1998. Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines. Academic Press, London.
3. Closs,G., Downes,B. and Boulton, A. 2004 "Freshwater Ecology : A Scientific Introduction"
4. Day,S. and Nasrin,B. 2014"Ecology of Aquatic Systems"
5. Dodds W and Whiles M. 2010. Freshwater Ecology, 2nd Edition, Concepts and Environmental Application of Limnology. Academic Press, London.
6. Kormondy EJ. 1986. Concepts of Ecology, Prentice-Hall, New Delhi.
7. Odum, E.P, 1987 " Basic Ecology"
8. Okuda N, Watanabe K, Fukumori K, Nakano SI and Nakazawa T. 2014. Biodiversity in aquatic systems and environments: Lake Biwa. Springer Japan.
9. Park CC. 1980. Ecology and Environmental Management. Butterworths, London.
10. Qasim, S.Z, 1999 "Indian Ocean – images and realities"
11. Verma, P.S. and Agarwal,A.K 2000"Environmental Biology : Principles of Ecology"



UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES

For the Examination to be held in Year 2026, 2027 & 2028

INDUSTRIAL FISH & FISHERIES COURSE

UG SEMESTER VIII (HONOURS WITH RESEARCH)

UNDER NEP-2020

University of Jammu

Syllabi of Industrial Fish and Fisheries for FYUGP under CBCS as per NEP-2020

SEMESTER-VIII (HONOURS WITH RESEARCH)

(Examination to be held in 2026, 2027 & 2028)

Major Course

Course Code: **UMJIFT-806** Course Title: **FISHERIES EXTENSION AND LEGISLATION**
Credits: 04 {03(Theory) + 01(Practical)} Total no. of lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Minor Course

Course Code: **UMIIFT-807** Course Title: **FISH LAWS AND EXTENSION EDUCATION**
Credits: 04 {03(Theory) + 01(Practical)} Total no. of lectures: Theory: 45 hours
Practical: 30 hours
Maximum Marks: 100
Theory: 75
Practical/Tutorial: 25

Skill Enhancement Course

Course Code: **USEIFT-808** Course Title: **DISSERTATION**
Credits: 12
Maximum Marks: 300



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2026, 2027 & 2028)
(MAJOR COURSE)

MAJOR CORE COURSE NO.	:	UMJIFT-806
MAJOR CORE COURSE TITLE	:	FISHERIES EXTENSION AND LEGISLATION
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The basic objectives of the present syllabus is to teach students about overall development of the rural people, to bring about desirable changes in the human behavior, which includes change in knowledge, skill and attitude, the dissemination of useful and practical information relating to fisheries, including improved seeds, fertilizers, implements, pesticides, improved cultural practices, dairying, poultry nutrition etc. along with appropriate solution of the farmer's problems moreover to bring the scientist closer to the farmers.

UNIT – 1:FUNDAMENTALS OF FISHERIES EXTENSION EDUCATION (13 Hrs.)

- 1.1 Introduction to Extension education
- 1.2 Principles of Extension education
- 1.3 Objectives and Functions of Extension education
- 1.4 Role of Extension in Fisheries Development

UNIT –2:EXTENSION PROGRAM (13 Hrs.)

- 2.1 Principles of Extension program
- 2.2 Steps in Extension program planning in Fisheries
- 2.3 Characteristics of a good Fisheries Extension program
- 2.4 A general view of Pradhan Mantri Matsya SampadaYojana(PMMSY) Extension program

UNIT 3: LEADERSHIP AND COMMUNICATION CHANNELS (15 Hrs.)

- 3.1 Leadership in Extension- Qualities and Functions of a Leader in Extension program
- 3.2 Technology- Definition, technology transfer and models
- 3.3 Communication, Types and Problems
- 3.4 Channels of Communication



UNIT 4: FISHERIES LEGISLATION

(10 Hrs.)

- 4.1 Indian Fisheries Act, 1897
- 4.2 Jammu and Kashmir fisheries act, 2018
- 4.3 Safety and legislation aspects of fish packing. Labeling and bar coding.
- 4.4 Legislation and jurisprudence in therapeutics for aquaculture organisms

Practicum

(30 Hrs.)

- 1. Visits to formal, informal and non-formal educational organization and familiarizes their functional activities
- 2. Technology of transfer, advisory work, and Human resource development in fisheries programmes
- 3. To study the mesh size regulation
- 4. Review of national, state and regional extension networks and policies
- 5. Seminars and debates on extension education
- 6. Preparation of elaborative report of extension programs
- 7. To study the construction and working of fishing gears
- 8. To display different channels of communication
- 9. Identification of different tools for technology transfer
- 10. Comparison of Fisheries Regulation Acts of different states

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous Assessment	-	-	10 (Based on Daily Performance only)
Final Practical Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) [Total marks 60]

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

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[Handwritten Signature]

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RECOMMENDED READINGS.

1. Adhikarya R. 1994. Strategic Extension Campaign – A Participatory-Oriented Method of Agricultural Extension. Food and Agriculture Organization. Agricultural Education and Extension Service.
2. Alex G et al. 2000. Decentralizing Agricultural Extension: Lessons and Good Practices. Washington, DC: The World Bank.
3. Anon. 1998. Maritime Law of India in the International Context. Bhadarkar Publ.
4. Antholt C & Zipp W. 1994. Participation in Agricultural Extension. Washington, DC: The World Bank
5. Bathrick DD. 1997. Fostering Global Well-Being: A New Paradigm to Revitalize Agricultural and Rural Development. Food, Agriculture, and the Environment discussion paper 26. Washington, DC: IFPRI.
6. Berdegue JA & Escobar G. 2001. Agricultural Knowledge and Information Systems and Poverty Reduction. AKIS Discussion Paper. Washington, DC: The World Bank.
7. Birner R & Anderson JR. 2007. How to Make Agricultural Extension Demand Driven–The Case of India's Agricultural Extension Policy. IFPRI Discussion Paper. International Food Policy Research Institute. Washington, DC: IFPRI.
8. Brahtz JFP. 1972. Coastal Zone Management. U.N. International Economic and Social Affairs, New York.
9. Burke William T. 1992. Fisheries regulations under extended jurisdiction and international law: "Food and Agricultural Organization of the United Nations.
10. Dixit 2013. Regulating oceanic fishing: international laws and treaties. Delhi Swastik Publications: "viii, 264p" ISBN: 978-93-81991-04-6
11. Human Resources, Institutions and Agrarian Reform Division. Rome: FAO.
12. Kumar. U. Biodiversity Principles and Conservation, Narendra Publishing House Publishers and Distributors
13. Pandey. 2014. Fisheries governance and legislation in India. Delhi Narendra Publishing House 2014: "xviii, 182p" ISBN: 978-93-82471-85-1



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2026, 2027 & 2028)
(MINOR COURSE)

MINOR CORE COURSE NO.	:	UMIIFT-807
MINOR CORE COURSE TITLE	:	FISH LAWS AND EXTENSION EDUCATION
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
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I) External (University Exam)	:	60
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4. Antholt C & Zijp W. 1994. Participation in Agricultural Extension. Washington, DC: The World Bank
5. Bathrick DD. 1997. Fostering Global Well-Being: A New Paradigm to Revitalize Agricultural and Rural Development. Food, Agriculture, and the Environment discussion paper 26. Washington, DC: IFPRI.
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UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH AND FISHERIES
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2026, 2027 & 2028)
(SKILL ENHANCEMENT COURSE)

CORE COURSE NO.	:	USEIFT808
CORE COURSE TITLE	:	DISSERTATION
CREDITS	:	12 {8 (Dissertation) + 4 (Viva)}
MAXIMUM MARKS	:	300
I) Dissertation	:	200
II) Presentation of PPT and viva	:	100

Objectives and Expected Learning Outcomes

The primary objective of this project work course is to facilitate the application of theoretical knowledge in solving real-world problems, fostering research competencies among undergraduate students. Through hands-on projects, students will develop critical thinking skills, and proficiency in data analysis. The course aims to cultivate a problem-solving mindset, enhance self-directed learning, and provide a platform for the acquisition of advanced knowledge through project-based study. Upon completion of the project work course, students will gain practical experience in applying academic concepts to real-life situations. They will develop strong research competencies, including data collection and analysis, literature review skills, and will be able to draw meaningful conclusions. Additionally, students will hone their communication, teamwork, and time management skills, preparing them for the challenges of their future careers or advanced academic pursuits. Overall, the course aims to equip students with the necessary skills and knowledge to thrive in professional and research-oriented environments.

Scheme of Research Project and Dissertation

Allotment of Supervisor:

Each student shall carry out a project work in one of the broad areas of Industrial Fish and Fisheries in the semester VIII under the supervision of a faculty of the department.

Research Work and Dissertation Writing:

1. After the approval of the proposal, the student will carry out the proposed research (field/lab. work) and post-completion of the research work, students will write the dissertation. During the field/lab. Work as well as during the compilation of the dissertation the student will work under continuous guidance of the supervisor who will maintain the regular attendance of the student.
2. Student will submit 2 hard copies of the final dissertation in the department along with a soft copy of the same.



Format for dissertation is given below:

The dissertation should be presented chapter wise. Each chapter will have a precise title as given below. A chapter can be subdivided into sections, and sub-section so as to present the content discretely and with due emphasis.

Abstract

Content Page

List of Figures

List of Tables

Acknowledgement

List of Abbreviations

Chapter 1: Introduction:

It shall justify and highlight the problem posed, define the topic and explain the aim and scope of the work presented in the dissertation. This chapter also include objective of the research work. It may also highlight the significant contributions from the investigation.

Chapter 2: Review of Literature:

This Chapter presents a critical appraisal of the previous work published in the literature pertaining to the topic of the investigation.

Chapter 3: Material and Methods:

This chapter deals with a detail methodology/technique/theory by which researcher used to carry out the research work.

Chapter 4: Results and Discussion:

This chapter includes a thorough evaluation of the investigation carried out and brings out the contributions from the study. The discussion shall logically lead to inferences and conclusions as well as scope for possible further future work.

Chapter 5: Summary and Conclusion

A brief report of the work carried out shall form the first part of the Chapter. Conclusions derived from the logical analysis presented in the results and discussions chapter shall be presented and clearly enumerated, each point stated separately. Scope for future work should be stated lucidly in the last part of this chapter.

Chapter 6: References/Bibliography:

The candidates shall follow the style for references as mentioned below.

For journal:

Loizides, M., Georgiou, A.N., Somarakis, S., Witten, P.E. and Koumoundouros, G., 2014. A new type of lordosis and vertebral body compression in G ilthead sea bream, *S parus aurata* L.: aetiology, anatomy and consequences for survival. *Journal of Fish Diseases*, 37(11), pp.949-957.



TYPE -SETTING, TEXT PROCESSING AND PRINTING

1. The text shall be printed employing using a standard text processor. The standard font shall be Times New Roman of 12 pts with 1.5 line spacing.
2. **Binding** Spiral or hard Binding
3. **Front Covers:**The front covers shall contain the following details:
 - a. Full title of dissertation in 6 mm/22 point's size font properly centered and positioned at the top.
 - b. Full name of the candidate in 4.5 mm 15 point's size font properly centered at the middle of the page.
 - c. 40 mm wide replica of the College and University emblems followed by the name of department, name of the College, name of the University and the year of submission, each in a separate line and properly centered and located at the bottom of page.
4. **Title Sheet:** This shall be the first printed page of the thesis and shall contain the submission statement: the dissertation submitted in partial fulfilment of the requirements of the B.Sc. (Honours) Industrial Fish and Fisheries, the name, Registration No. and University Roll No. of the candidate, name(s) of the Supervisor, Department, College, University and year of submission.
5. **A Declaration of Academic Honesty and Integrity by Candidate:**A declaration of Academic honesty and integrity is required to be included along with every dissertation. The format of this declaration is given in **Annexure-I** attached.
6. **Certificate from Supervisor (Annexure-II):**
7. **Abstract:**The 500 word (maximum) abstract shall highlight the important features of the dissertation.

Evaluation of the dissertation:

1. The project report/dissertation shall be evaluated by the external expert from other University/Colleges to be nominated by the Principal out of the panel supplied by the College Research Committee (CRC) in accordance with Guidelines for FYUGP issued by the University of Jammu.
2. The students shall be declared pass in the research project course if she/he secures minimum 40% marks (Dissertation and viva).



ANNEXURE-I

CERTIFICATE

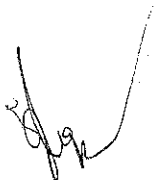
The work embodied in this dissertation entitled “
..... ” (write the title in capital letters) has been
carried out by me under the supervision of
.....(give the name of the Guide).

This work is original and has not been submitted by me for the award of any other degree of University of Jammu or any other University. I also declare that no chapter of this manuscript in whole or in part is lifted and incorporated.

.....
.....
(Signature and Name of the Candidate)

Date :

Place :



ANNEXURE-II

CERTIFICATE OF DISSERTATION GUIDE/SUPERVISOR

I certify that the candidate /Mr./Ms./Mrs has planned and conducted the research study entitled “.....” under my guidance and supervision and that the report submitted herewith is a genuine, original, and bonafide work done by the candidate in (Place) from..... to (Dates).

.....
.....
(Signature and Name of the Supervisor)

Date :

Place :

.....
.....
Name, Signature of HoD

